

CLAIMS

1. A variable-reluctance analog position transducer intended to determine the variation of position of a target (1), comprising a target (1) made of a ferromagnetic material and at least one magnet (2), the target and the magnet defining between one another an air gap (8), the device additionally being provided with a magnetosensitive element (3) detecting the variation of induction caused in the air gap by the displacement of the target (1) relative to the magnet (2), characterized in that the magnet (2) is magnetized along a direction substantially perpendicular to the front surface (9) of the magnet bounding one edge of the air gap (8), the said magnet having a cavity (10) opening on the said front surface (9) of the magnet, the magnetosensitive element (3) being seated in the said cavity (10), the target (1) having a geometric configuration designed such that the variation of induction as a function of the said position of the target (1) corresponds to a predefined function.

2. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the target (1) is translationally mobile along an axis perpendicular to the axis of magnetization of the said magnet (2).

3. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the target (1) is translationally mobile along an axis parallel to the axis of magnetization of the said magnet (2).

4. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the target (1) is rotationally mobile around a shaft perpendicular to the axis

of magnetization of the said magnet (2).

5. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the target (1) is rotationally mobile around a shaft parallel to the axis of magnetization of the said magnet (2).

6. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to any one of the preceding claims, characterized in that the plane in which displacement of the target (1) takes place is included in a plane passing through the center of the magnetosensitive element (2).

7. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that a ferromagnetic piece is adhesively bonded to the back of the aforesaid magnet (2).

8. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 7, characterized in that the aforesaid magnet (2) is adhesively bonded to a T-shaped ferromagnetic piece.

9. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the target (1) has a particular or optimized shape, suitable for delivering a linear induction B as a function of the displacement of the said target (1).

10. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 1, characterized in that the magnetosensitive element (3) is placed in the cavity in a zone (4) of minimal induction.

11. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 4, 5 or 6, characterized in that the target (1) comprises at least one spiral tooth (5).

12. An analog position transducer according to claim 11, characterized in that the target (1) comprises three spiral teeth (5), each disposed at an angle of 120° .

13. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 11 or 12, characterized in that the maximum measurable angular travel is close to 360° .

14. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 2 or 3, characterized in that the target (1) has a shape designed to generate a variation of thickness of the air gap that is a function of the position relative to the magnet (1).

15. A variable-reluctance analog position transducer, intended to determine the position of a target (1) according to claim 3, characterized in that the magnet (2) and the magnetosensitive element (3) are disposed opposite a ferromagnetic membrane (6) capable of being deformed under the effect of a force (7) applied vertically to the said membrane (6).

16. An angular position transducer for a camshaft or crankshaft, characterized in that it is provided with an analog position sensor according to claim 4, 5 or 6.

17. A method for construction of a target (1) for an analog position transducer according to claims 1 to 15, made of a ferromagnetic material, having a desired induction signal B, characterized in that it comprises the following steps:

- establishment of a first geometric shape for the aforesaid target (1),
- positioning of points on the target (1); these points having coordinates (x, y) in a viewing plane of spatial coordinates (x, y, z),
- calculation of the magnetic induction signal B as a function of the linear or rotary displacement of the target (1); the displacement of the target (1) being effected over a predefined trajectory,
- modification of the coordinates of one of the aforesaid points and recalculation of the induction B as a function of the position of the target (1) in order to determine the influence of this point on the induction B measured by the aforesaid magnet (2),
- determination of a matrix and solving of an equation suitable for defining the new geometric shape of the aforesaid first shape determined previously for the target (1),
- repetition of the aforesaid calculation, modification and determination steps until there is obtained a magnetic induction B as a function of the linear or rotary displacement of the target (1), satisfying, that is, in conformity with the desired linearity criteria, or until there is obtained a nonlinear function $f(x)$.